

NEW SPECIES OF SIMULIIDAE (DIPTERA, NEMATOCERA) FROM
NEW SOUTH WALES.

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(Twenty-one Text-figures.)

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INTRODUCTION.

Unfortunately the following information could not be included in the "Revisional Notes on Australasian Simuliidae (Diptera)", by I. M. and M. J. Mackerras (these PROCEEDINGS, lxxiii, p. 372, and is given here to complete our present knowledge of the Australasian Simuliidae. One new species of *Simulium* is described, additional notes are made on *Austrosimulium crassipes* Tonnoir, including an account of the female and immature stages, and an unknown Simuliid larva is described.

SIMULIUM MELATUM, n. sp.

Types.—Pinned holotype female and allotype male in the Macleay Museum, University of Sydney. Morphotype larva and pupa and one male paratype mounted on slides, larval and pupal specimens in alcohol also in the Macleay Museum. One female paratype, larvae and pupae in the Queensland Institute of Medical Research.

Type Locality.—Lett River, Hartley, Blue Mountains, New South Wales (Wharton, January, 1948).

DISTINCTIVE CHARACTERS.

This species belongs to the *clathrinum* group of the genus *Simulium* as defined by M. J. and I. M. Mackerras. From all described Australian species *S. melatum* may be distinguished as an adult by the completely dark legs; in all other species the first hind tarsi have a broad pale band. *S. oculata* Enderlein is the only New Guinea species with which it could be confused, but the silver scales of *S. melatum* on the frons, mesonotum, and sides of the abdomen should differ from the golden-yellow and metallic-yellow pubescence of *S. oculata*. In addition, the enlarged upper facets of the eye in the male *S. oculata* are stated to have a diameter greater than the diameter of the antennal flagella segments; in *S. melatum* these facets have little more than half the diameter of the antennal segments.

The pupa and cocoon together are distinct. The pupa resembles *S. clathrinum* and *S. ornatipes* in that each respiratory organ consists of four filaments arising from a short base. These filaments, however, are intermediate in size between the smooth, very stout filaments of *S. ornatipes* and the relatively smooth, slender filaments of *S. clathrinum*. Furthermore, the filaments have a coarse, granulated, irregularly wrinkled appearance. The cocoon is similar to that of *S. ornatipes*, but the dorsal projection is longer in *S. melatum*.

The larva, with dark pigmentation on most of the head capsule, simple rectal gills and the absence of ventral papillae differs from any known Australasian *Simulium* and on key characters could only be confused with *Cnephia* species, from which it can be easily separated on the form and number of teeth in the anal circle.

DESCRIPTION.

Female.

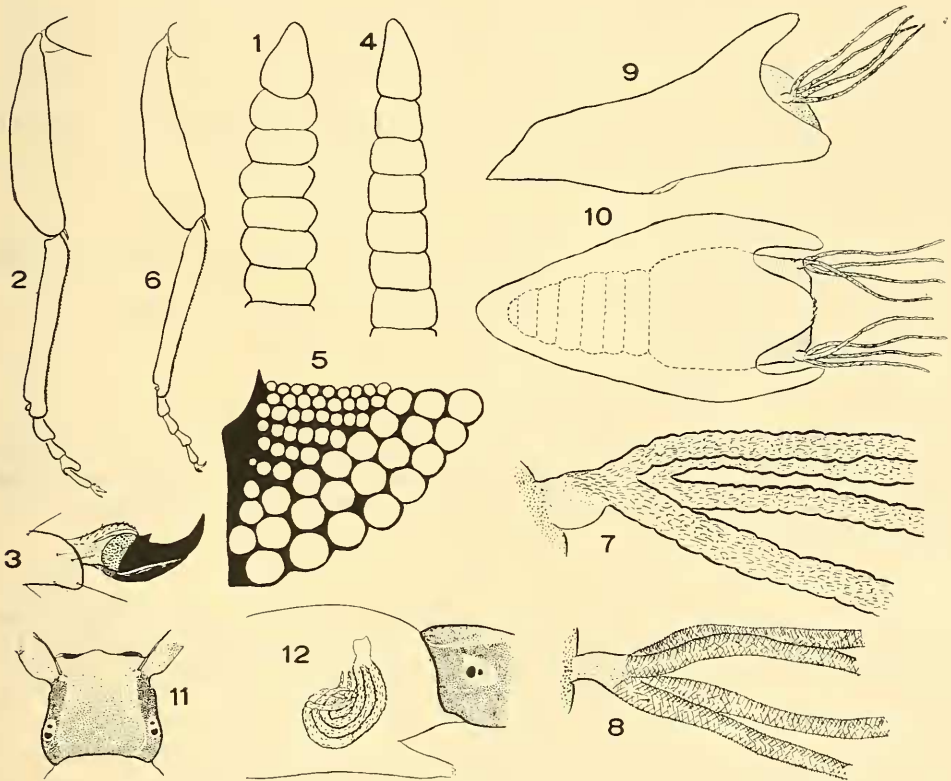
Length: 2.25 mm.; wing 2 mm.

Head.—The vertex and occiput are dull black and sparsely covered with silver-grey hairs. The frons is grey with a silver-grey pubescence, the frons slightly longer than

wide and between one-quarter and one-third of the maximum width of the head. The antennae (Text-fig. 1) are composed of eleven segments, of which the basal two are brown and the remainder dark brown to black, with a fine grey pubescence. The palpi are normal for the group.

Thorax.—The mesonotum is black with a covering of fine silver scales. The pleura are dull black and bare, except for a patch of silver scales on the membranous (prealar) area behind the mesothoracic spiracle, a group of longer silver scales on the propleuron and a patch of pale bristles on the lower sterno-pleuron. The scales on the scutellum are silver and the halteres are dark brown at the base with cream knobs.

Legs (Text-fig. 2).—The legs are almost uniformly dark brown to black with only the bases of the tibiae light brown and a faint suggestion of a lighter colour in the form of a broad band on the first hind tarsi. The hairs on the legs are normal, many short dark brown hairs on all segments, striated scales on the femora and tibiae which



Text-figures 1-12.

Figs. 1-6 and 9-12. *Simulium melatum*, n. sp. Female: 1, antennal flagellar segments $\times 175$; 2, hind leg $\times 40$; 3, tarsal claws $\times 175$. Male: 4, antennal flagellar segments $\times 175$; 5, facets of eye $\times 175$; 6, hind leg $\times 40$. Pupa and cocoon $\times 8$: 9, lateral view; 10, dorsal view. Larva: 11, head, dorsal view $\times 25$; 12, gill spot $\times 25$. Basal portion of pupal respiratory organ $\times 50$: 7, *S. melatum*; 8, *S. clathrinum*.

glisten with direct lighting, and elongated hairs on the fore and hind tarsi. There do not appear to be any particular regions where the hairs show distinctive colouring. The hind tibiae are slightly angulated and longer than the first hind tarsi. The calcipalus is from half to two-thirds of the width of the first hind tarsus and the pediculus is clearly defined. A very small basal tooth is present on the tarsal claws (Text-fig. 3).

Wings.—At the wing base the veins are dark and the wing-membrane is clouded. The venation and distribution of macrotrichia are normal for the group.

Abdomen.—There are a few silver scales on the first and second tergites, but the remainder of the scales on the dorsal surface of the abdomen are dark brown. At the junction between the dorsal and lateral margins of the abdomen there is a distinct line where the dark scales of the dorsal surface are replaced largely by silver-grey scales, particularly on the second, third, fourth and fifth segments. These lighter scales thin out towards the ventral surface, which is almost bare and grey in colour.

Male.

Length 2.3 mm.; wing 2 mm.

Head.—The clypeus is black, appearing frosted in some lights but with no silver-grey pubescence as in the female. The antennae have all the segments dark brown to black, with only the junctions between the first and second segments a lighter brown; in addition the flagella segments appear to be relatively longer than in the female (Text-fig. 4). The enlarged upper facets of the eye (Text-fig. 5) have approximately the same diameter as those of *S. nicholsoni* M. J. and I. M. Mackerras, and thus are smaller than those of *S. clathrinum* M. J. and I. M. Mackerras and *S. papuensis* Wharton.

Thorax.—The scales on the mesonotum, though in most lights silver, may sometimes appear golden, whereas in the female these scales are always silver.

Legs.—The hind tibia is more enlarged and more angulated (Text-fig. 6) than in the female; otherwise the legs are similar in both sexes.

Abdomen.—Similar to that of the female, but the dark scales on the dorsal surface extend further down the lateral surfaces and, when replaced by the silver scales, these scales are not as numerous as in the female.

Genitalia.—The genitalia do not appear to show any distinctive features.

Pupa.

Length about 4 mm. Dark brown in colour.

The pupa resembles *S. clathrinum* in all details except the form of the respiratory organs, which consist of four elongated dark filaments arising from a short, light brown base. The filaments are relatively longer and stouter than those of *S. clathrinum* and the surface of the filaments has a coarse, irregularly wrinkled appearance (Text-figs. 7 and 8).

Cocoon.

A typical wall pocket type, resembling *S. ornatipes* Skuse in having a median dorsal projection which reaches the base of the pupal respiratory organs (Text-figs. 9 and 10). No anterior collar is present and texture of the cocoon is about the same as in *S. clathrinum*.

Larva.

Length 5–6 mm. Robust. Head dark, thorax and abdomen grey.

Head (Text-figs. 11 and 12).—The pigmentation of the fronto-clypeus is uniformly heavy along the posterior margin, gradually becoming less obvious towards the anterior margin, where pigment is usually lacking. Except for a small area around the eyes the lateral and ventral surfaces of the head are almost uniformly dark. The ventral fissure is well marked but not as deep as in *S. papuensis*. In other respects the head is similar to other members of the *clathrinum* group.

Thorax.—The gill spot (Text-fig. 12) is closest to *S. clathrinum* but is larger, and the coarse, wrinkled appearance of the filaments is again distinctive.

Abdomen.—The anal sclerite is normal, with no backwardly directed strut, but the rectal (anal) gills are simple; ventral papillae are absent, though ventro-lateral swellings, as in *S. clathrinum*, may be present. The anal cirlet consists of some seventy to eighty rows of hooks, each row with twelve or thirteen hooks.

Biology.—The early stages have been collected from grass blades in swiftly running, clear water, together with the early stages of *S. ornatipes*, *Austrosimulium furiosum* and *A. bancrofti*. Early stages have also been found in large numbers on the surface of rocks in small streams at the point where the flow is the greatest; in these cases *S. melatum* has been the only species present. No adults have been collected, sweeping the surrounding vegetation having given no results.

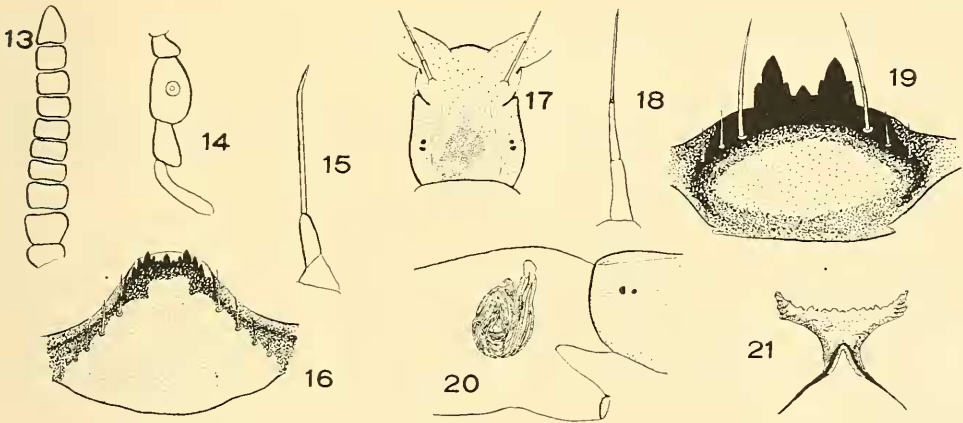
Distribution.—New South Wales, Blue Mountains district, Hartley, December, January and March; Mount Victoria, March. Sydney district, Oxford Falls, November. All specimens collected by author.

AUSTROSIMULIUM CRASSIPES Tonnoir.

As stated by Mackerras (1948), I have recently found the early stages of an *Austrosimulium* species, the male of which is very similar to Tonnoir's unique male type of *A. crassipes*. It seems likely that when the female and immature stages of Tonnoir's species have been taken at the type locality in Victoria they will conform with the following description. As the distinctive characters have already been outlined by Mackerras only such additional notes as may be needed to give a positive identification have been added.

Types.—Male type in Division of Economic Entomology, C.S.I.R., Canberra. Allotype female and paratype male, morphotype larva, pupa and cocoon, together with larvae and pupae, in the Macleay Museum, University of Sydney.

Type Locality.—Sassafras, Victoria (Tonnoir, 1922). Allotype female and immature stages collected at Fairy Bower, Mount Victoria, New South Wales (Wharton, January, 1948).



Text-figures 13-21.

Figs. 13-16. *Austrosimulium crassipes* Tonnoir. 13. Female antenna $\times 65$. 14. Female palpus $\times 65$. 15. Larval antenna $\times 65$. 16. Larval labium $\times 175$.

Text-figs. 17-21. Unknown Simuliid larva. 17. Head, dorsal view, $\times 25$. 18. Antenna $\times 175$. 19. Labium $\times 175$. 20. Gill spot $\times 25$. 21. Anal armature $\times 175$.

DESCRIPTION.

Female.

Length 2.4 mm.; wing 2.5 mm.

Head.—The frons, vertex and occiput are grey with a silver pubescence, the frons about one-third of the maximum width of the head and longer than wide. The second segment of the antenna is brown, the third and flagellar segments dark brown to black, the flagellar segments with grey pubescence. The size and shape of the various antennal segments are as illustrated (Text-fig. 13). The palpi are black, the two basal segments small, the third swollen, longer than the fourth, which is half the length of the thin, elongated terminal segment (Text-fig. 14).

Thorax.—The mesonotum is black with relatively long creamy-yellow hairs, which are uniformly distributed over the scutum to the base of the scutellum, which is black, with only a few scattered yellow hairs on its surface. The pleura are dark brown to black, but certain regions, particularly the anepisternum and lower sternopleuron, show grey reflections. Propleural hairs are absent, the upper mesepimeral hairs are dark, and a single dark hair on the sternopleuron is visible.

The postnotum is black and the halteres have a dark brown base with a broad pale cream knob, the pale colouring extending downwards on one side of the stem.

Legs.—Completely dark, but the femora and tibiae bear some yellow hairs in addition to the normal dark brown to black hairs. The fore and mid legs are of normal size, the femur and tibia equal in length in the fore legs, the tibia slightly longer than the femur in the mid legs. The femur, tibia and first hind tarsus of the hind leg are all swollen, and the tarsus is distinctly curved (Mackerras, 1948, Text-fig. 13B). The calcipalus is large, almost as wide as the metatarsus, but separated from it by a slight notch. The pedisulcus is well defined and all the tarsal claws bear a strong basal tooth.

Wings.—The wing venation is normal, the wing membrane at the base is clouded and the main veins are dark brown.

Abdomen.—Long creamy yellow hairs are present on the lateral margins of the first segment, otherwise the abdomen is completely dark brown to black with only scattered fine dark brown and yellow hairs on all segments.

Male.

Length 2.4 mm.; wing 2.5 mm.

The male description follows that given by Tonnoir, with the following additions and distinctions.

Head.—The second antennal segment is similar to that of the female, definitely lighter in colour than the remaining segments. The incrassate third segment of the palpus is slightly longer than the fourth, which is a little more than half the length of the elongated fifth segment.

Thorax.—The mesonotum is darker than in the females, as also are the halteres which are dark up to and including the basal portion of the knob.

Legs.—The tarsi of the fore leg are equal in length to the tibia, which is itself equal to the femur. The mid leg tarsi are distinctly longer (subequal according to Tonnoir) than the corresponding tibia and femur, which are again equal. The first hind tarsus is very characteristic, more swollen than in the female, though not quite as incrassate as in Tonnoir's type male (Tonnoir, 1925, fig. 2 (I); Mackerras, 1948, Text-fig. 13A).

Abdomen.—Similar to that of the female, but more yellow hairs are present.

Pupa.

Length about 3 mm. Light brown in colour.

The surface of the cephalothorax bears minute granules which are larger and darker around the base of the respiratory organs and on the head region. The thoracic notum carries a pair of short, stout curved bristles on either side of the mid-line and a long hair at the base of the respiratory organ. These organs are characteristic (Mackerras, 1948, Text-figs. 12 and 20).

On the dorsal surface of the abdomen six subapical hooks are present on each of the third and fourth segments. Ventrally there are four subapical spines on the fifth, two on the sixth and two on the seventh segments. The terminal spines are comparatively large, upwardly and inwardly directed.

Cocoon.

A typical *Austrosimulium*, finely woven, neatly formed and incomplete beneath the abdomen of the pupa (Mackerras, 1948, Text-fig. 20).

Larva.

Length 4–5 mm. Head light brown, thorax and abdomen grey.

Head.—The posterior margin of the head capsule is ringed with dark pigment, otherwise, apart from a median longitudinal interrupted band and a pair of submedian circular patches, the head is only lightly segmented (Mackerras, 1948, Text-fig. 13E). The slender second segment of the antenna (Text-fig. 15) is twice the length of the stout basal segment and the antenna is distinctly longer than the base of the mouth fan. The submentum consists of thirteen teeth with five hairs laterally placed on either side (Text-fig. 16).

Thorax.—The gill spot (Mackerras, 1948, Text-fig. 13D) is distinctive, with a pale base and six filaments, which are coiled anterior to the base in a remarkably even manner.

Abdomen.—The rectal gills are simple and a pair of ventral papillae (basal tubercles) are present on the last segments. The anal armature (Mackerras, 1948, Text-fig. 9) possesses a backwardly directed strut and a chitinous rod which encircles the abdomen beneath the anal sclerite—the ends of the ring are tapered off to end just below the posterior arms of the anal sclerite. The anal circlet consists of about ninety rows of hooks, each row containing 12 to 15 teeth.

Biology.—The larvae were collected on leaves and the pupae on stones in small mountain streams. The immature stages were not numerous and have been found in company with *A. victoriae*, *A. furiosum* and an unknown Simuliid larva.

Distribution.—Sassafras, Victoria; Mount Victoria and Wentworth Falls, Blue Mountains, New South Wales.

SIMULIID LARVA.

Genus and Species Unknown.

To assist subsequent collectors, the description of a single larva, collected at Engineer's Cascade, Mount Victoria, New South Wales, in company with the immature stages of *A. crassipes* Tonnoir is here undertaken. The larva shows affinities with larvae of the genus *Cnephia* and the genus *Simulium*, and may possibly be the larva of one of the described species belonging to *umbratorum* group of the genus *Cnephia*. The submentum is the most characteristic feature of the larva in that it consists of only three conspicuous teeth.

Description of Larva.

Length 5–7 mm. Head light yellow-brown, thorax and abdomen yellowish.

Head (Text-fig. 17).—The head is distinctly longer than broad, at no point is the capsule heavily pigmented, but the posterior margins and a median longitudinal region on the frontoclypeus are darker than the remainder. The eyes are small, the anterior pair circular in outline, the posterior pair slightly larger and again circular, but with the anterior margin flattened. The antennae (Text-fig. 18) are slightly longer than the base of the mouth fan—the basal segment almost one and a half times the length of the second segment. The submentum (Text-fig. 19) consists of three teeth, an extremely large tooth on each side with clearly defined shoulders and a much smaller simple median tooth. In addition three bristles, one large and two small, are present lateral and posterior to the outer tooth on each side.

Thorax.—The gill spot (Text-fig. 20) is dark with a yellow base and is oval in shape. The filaments are coiled posterior to the main stem in a manner typical of the genus *Simulium*. When dissected the future respiratory organ appears to consist of twelve extremely long, slender filaments arising from four main stems, i.e. the form found in the genus *Cnephia*.

Abdomen.—No rectal gills are visible. The anal sclerite (Text-fig. 21) is well developed but does not possess backwardly directed struts. The anal circlet consists of about fifty rows of hooks, each row containing 10–13 hooks. Ventral papillae are present and clearly defined.

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